Design in the Anthropocene: Assessment 1 Concept Proposal

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Introduction

Despite the rising concerns in the scientific community about the effects of consumerist lifestyles on the planet, there is a wealth of misinformation that pollutes media and information channels. False science, corrupt spokespeople and cherry-picked data lead the poorly informed public into a confused stupor. The community is in need of new ways to combat the misinformation while maintaining active community engagement with the issue. A concerning number of people find themselves either sceptical or in neglect of the climate catastrophe which has ravaged the planet's natural resources. While awareness is on the rise, the vast majority of the general population lacks the knowledge and initiative to take direct action to combat the catastrophe. By observing the population's discussion around the issue and understanding the current state of the problem area through an array of contextual observation methods (online ethnography and market analysis) and direct inquiries (speculative fiction writing and online surveys), general perceptions of climate change among the Australian population were documented. Most importantly, the goals, aspirations and motivational factors that drive people into action were identified and observed. Additionally, the data synthesised through the research facilitates the identification of factors that are imperative in consideration of future design artifacts intended to tackle this problem area/design space.

Project Brief

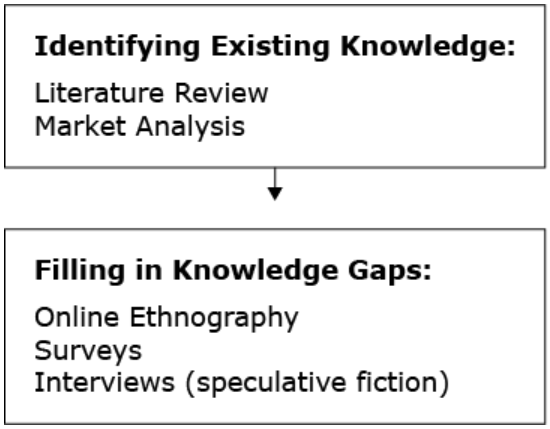
While the collective problem the team is tasked with solving remains the population's greater contribution to the climate change catastrophe, the key focus of this proposal remains on the bottom line of the process: individual action. Through multiple rounds of research, market analysis and contextual enquiry, the team's aim is to gauge the population's receptiveness to potential action triggers. Additionally, one of the greatest challenges remains in identifying the current barriers which prevent people from changing their behaviour in contribution to the fight against climate change.

Instead of targeting particular behaviour, the team seeks to provide the audience with the knowledge and tools they need to take initiative and build their own journey towards a more sustainable future. By identifying the key motivations behind climate change activism in the general population and complimenting them with existing strategies adopted from other fields, the drive for action can be harnessed within the target audience. Through a set of prototypes, such strategies will be tested for uptake rates among the general population before a final product is designed and developed.

By encouraging action and engagement, the solution will overcome the desensitization and guide the target audience towards direct action. Their individual contribution is intended to encourage community action and engagement, triggering a greater movement for change.

Background Research

In order to gain a thorough understanding of the problem space, two stages of research were conducted (Figure 1).



(Figure 1 - Research overview)

The first stage encompasses the existing body of knowledge. When working in such a current and rapidly escalating landscape, it is imperative to maintain an up-to-date understanding of the consensus around the present state of the issue. A literature review facilitated the analysis of existing studies on perceptions and attitudes of our target population, and a market analysis described the competitive landscape our solution will be operating in.

To fill any knowledge gaps not covered by the secondary research, corroborate the secondary research findings as well as to explore niche areas of interest, primary research was utilised. Online ethnographies assisted the team's understanding of the discussions around scepticism and denial of the issue, surveys ensured the applicability of larger research studies to our target population and interviews provided an insight into the perceptions of consequences among the target audience.

Literature review

While the worsening state of the climate is a complex problem escalated by multiple factors, some of the contributing determinants are within the control of an individual. Some household activities such as household waste management, environmentally conscious purchasing decisions and the support of corporations which seek to shift to sustainable production remain in the hands of independent individuals. However, this is not always the case. The Guardian conducted a study in 2017, which revealed that just 100 companies are responsible for 71% of global emissions. While to most this may seem like an opportunity to shift the blame, we must remember that supply is driven by demand. The power to stop climate change lies in the purchasing and lifestyle decisions that consumers make. For instance, banks and superfunds are essential in the modern Australian lifestyle, but the role that they play in the climate crisis goes unnoticed. The money that

customers choose to keep within these institutions is often invested in damaging but profitable industries. Simply by switching to a sustainability-focused bank or superfund, consumers can put their money towards carbon offsets at no individual cost.

Similarly, air travel is relatively one of the highest consumers of fossil fuels, with no sustainable alternative in development. As a result, they have been exempt from the carbon tax for years, with recent regulations only requiring regular carbon offset purchases as an effort towards a sustainable future. While international travel does not offer many alternatives, Australians have access to a reliable network of trains that cover a large portion of the country. Low-emission electric trains can take passengers around the state and across state borders safely and comfortably, at a lower cost.

Climate Change Denial:

A global effort to mitigate the effects of climate change cannot be discussed without addressing the numerous individuals who perpetuate scepticism and denial among the population. The greater scientific community has grouped the conversations around climate change denial into 5 distinct streams: scientific, economic, humanitarian, political and crisis denial. Scientific denial remains the largest and most prominent, fluctuating between using research conducted by parties who profit from environmentally damaging interests twisting existing data to tell a different story. This understanding is easy to debunk, as the overwhelming consensus among the scientific community was reached through thousands of peer-reviewed studies and models that corroborate each other. A more subtle stream of thought is economic denial, which claims that climate change is far too expensive to fix. Contrary to this claim, economists suggest that only 1% of the GDP is required to make a sufficient contribution to mitigating the crisis. It's worth noting that the GDP is estimated to grow by approximately 3.5% every year, meaning that such a small contribution will still leave the economy in a state of growth. In contrast, the fossil fuel industry receives over 6% of the GDP in subsidies every year. The next argument, referred to as "Humanitarian Denial", argues that warmer temperatures increase farming yields and have a net positive effect on the world's population. These gains, however, are often offset by the drier summers and increased frequency of heatwaves in those same areas. For example, the 2010 "Moscow" heat wave killed 11,000 people, devastated the Russian wheat harvest, and increased global food prices. The political denial argument claims that without a global unification against the climate, individual country action is ineffective. This belief is also perpetuated within the general population, implying that individual citizens' impact does not sufficiently contribute to the overall effort. This belief can be disproven by examining individual countries' contributions to global carbon emissions, as not all countries are as guilty as others. For example, 25% of the human-produced CO_2 in the atmosphere is generated by the US, another 22% is produced by the EU. Africa produces just under 5%. The last and most damaging argument is referred to as crisis denial. This talking point argues that the current situation should be assessed further, especially given the uncertainty in the above areas. Additionally, sceptics argue that the future holds greater resources and an economy of plenty, which will allow for better solutions to the issue with minimal sacrifice. Similarly, hollow arguments were used in the past to delay ending slavery, granting women the right to vote, ending colonial rule, ending segregation, decriminalising homosexuality, bolstering worker's rights and environmental regulations, allowing same sex marriages and banning smoking. With consideration of the fact that all strains of denial can be debunked, our challenge remains to understand the environment in which they are perpetuated and foster an atmosphere

in which our audience is encouraged to be receptive and critical of the available information.

Understanding how our target audience perceives the impact of climate change is critical to motivating successful mitigation efforts (Leiserowitz 2006; Lorenzoni and Pidgeon 2006). A wide range of scholarly articles were used to address the problem area at hand.

There is currently some existing understanding among the population of the direct impact climate change will have on their lifestyle. Past studies have found that on average 40% of the American public believes that climate change will affect them personally (Marlon et al. 2016). A study focused on metropolitan areas of three western U.S. cities (Denver, CO; Las Vegas, NV; Phoenix, AZ) found that "60% of respondents identified climate change as personally risky, with the perception that it will impact either their family or their city in the next 30 years." (Sullivan, A., & White, D. D. 2019) Similarly, a study conducted across Australia and Britain revealed that a large proportion of the population perceive climate change to have a direct impact on their lifestyle (family, environment, personal) (Reser et al. 2012). Traditionally, researchers were under the impression that there was a gap between public and expert perceptions of climate change risk, but the growing rates of awareness indicate that this gap may be decreasing.

However, despite increased rates of awareness, citizens of most western countries lack first person interaction with direct effects of climate change. This disconnect consequently poses a barrier to the engagement of the public in climate change adaptation and mitigation efforts (Weber 2011). Moreover, Americans that believe climate change will primarily affect people from distant countries are less likely to support adaptation policies (Singh et al. 2017). This lack of personal experience, in turn, results in individuals seeing no direct connection between their actions and climate change. Specifically, this is translated to feelings of powerlessness and inability to help. In the study conducted in 2012, a large proportion of participants expressed the following sentiments:

- "It upsets me that there seems to be so little that I can do to address environmental problems such as climate change"
- "I am tired of hearing about it and I want to see some action taken" (Reser et al. 2012).

Furthermore, when participants were asked whether they felt personally responsible for the unfolding consequences of climate change, a large proportion of participants strongly disagreed. When asked "Which of the following do you think should be mainly responsible for taking action against climate change? " most respondents expressed that national governments, the international community, and the industrial corporate sector bear a strong responsibility for taking action to combat climate change. It's worth noting that the Australian multiple response data shows a slightly higher responsibility being placed on individuals and families when compared to the American population. These trends highlight a need for higher engagement of the community with the direct consequences of their lifestyle decisions.

Skepticism and Trust:

"Scepticism is a subjective feeling, evoked by disbelief or mistrust that results in doubt, questioning, or rejection of a claim, which may collectively be called resistance to persuasion." (Giarlo, M. J., 2006). It is a multidimensional construct, formed out of doubt or a disposition to incredulity either in general or toward a particular object (Boush et al., 1994; Fiscella et al., 1999; Tan, 2002). A 2011 report concludes that roughly two-thirds of the public express doubts about the news media's fairness (Earl Bennett, 2001). This is

a significant increase over the mid-1980s when approximately half of Americans doubted the press's fairness. In a study conducted in 2012, when asked" How much do you trust what different sources say about the environment?", a large proportion of respondents favoured scientists over media sources and the government (Reser et al. 2012). In contrast, when asked whether they think there is a consensus about climate change in the scientific community, the participants were almost equally divided on the issue.

Specifically, the primary impact of media coverage is believed to be on social level perceptions rather than on personal attitudes and beliefs. In other words, the media is far more likely to convince people that public attitudes toward abortion have become increasingly favourable than they are to alter people's personal attitudes toward this issue' (Tsfati, 2002). Furthermore, it is hypothesized that media trust is associated with news media exposure and can be explained less as a cognitive and a rational process and more as a result of a process of selective exposure (Sears & Freedman, 1967, p. 194). It is the combination of persuasion through mass support and selective exposure that, in turn, leads individuals into adopting the broadcasted views.

Moreover, a salient psychological impact of climate change is the mental distress in response to media coverage (e.g., Berry et al., 2008; Doherty & Clayton, 2011; Fritze, Blashki, Burke & Wiseman, 2008; Reser et al., 2011). Joseph Reser specifically addressed distress response in the context of climate change, revealing that 24% of respondents were experiencing discomfort each time they see or read media coverage on the impacts and consequences of climate change (Reser et al. 2012). The overall desensitisation developed by people as a distress mitigation mechanism complicates the landscape in which information sources function. These findings are specifically significant to the design brief, as the task remains to present information in a comfortable and trustworthy format to ensure successful uptake.

Market Analysis

Stakeholder Identification

To achieve a better understanding of the landscape within which the design will function, all potential stakeholders were considered. Within a 5-minute brainstorming session, all known parties were listed by the team on sticky notes. Collectively, the team identified over 25 independent parties within the future design's environment. The management of stakeholders was further eased by affinity-mapping individual parties to identify broader groups they belonged to. The resulting schema provided a visual representation of the stakeholder landscape:

Category	Individual Stakeholders
Under Scrutiny	• Large Corporations • CEOs • Law-makers • Lobbyists/ Government parties
Potential Users	• General Population • Students • Younger Generations • Internet Users

Wider Impacted Parties	• Scientists • Researchers • Local Communities • Small Businesses • The University
Development Team	• Testers • Mentors • Immediate Teammates • Final Developers • Potential Investors
Key Promoters	• Media Companies • Social Media • Influencers • NGO's • Sustainability- focused business • Climate Change activists

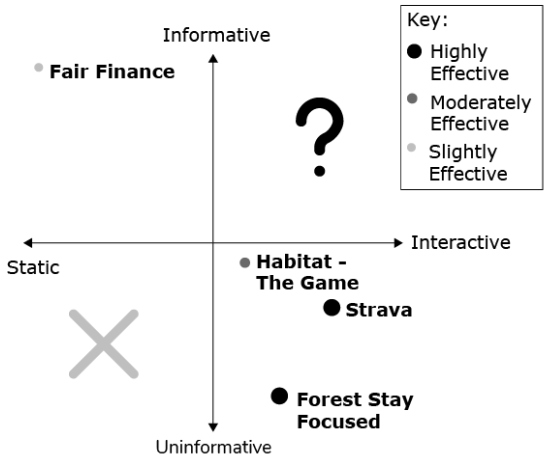
Evaluating Existing Solutions
To further analyse the competitive landscape, existing solutions and similar products targeting the problem area were evaluated and mapped across different dimensions. Each existing product was evaluated against a set of variables:

- Firm Size
- Reach
- Overall level of interactivity
- Is accountability actively encouraged?
- Intended frequency of use
- Educational capabilities
- Intended audience
- Incentivisation

The products whether then placed on a perceptual map, where they were ranked against 2 variables:

- Educational capabilities
- Degree of interactivity/engagement

The resulting model allowed for easy identification of market gaps, as well as providing a succinct overview of existing efforts.



(Figure 2 - Perceptual Map of competitive landscape)

The solution range included products targeting behavioural change and continued accountability, as well as educational material on climate change.

1. Fair Finance International (FFI) is an international civil society network of 70 CSOs, initiated by Oxfam, that seeks to strengthen the commitment of banks and other financial institutions to social, environmental and human rights standards. FFI is currently active in 10

countries: Belgium, Brazil, Germany, Indonesia, Japan, Netherlands, Norway, Sweden, Thailand, and India. The Fair Finance coalitions use a third party, Profundo, to develop a rigorous methodology to assess and monitor bank policies and practices. FFI presents information in the form of an engaging data visualisation that uses colours and emoji to represent each particular business's policies on social, environmental and human rights standards.

2. Strava is a fitness-focused social platform. In the app, users can track and upload their rides (and runs) using GPS data, either from Strava's dedicated app on a smartphone or via a third-party GPS bike computer, such as those from Fitbit. In the app, users can view friends' progress and interact with each other through commenting on each others' exercise and giving 'kudos' where they think it is deserved. The app includes gamification features, such as the leaderboard, where users are able to view the fastest runs/rides. Rewards are given to those with the fastest times, nominating users as King of the Mountain (KOM) or Queen of the Mountain (QOM) with a crown symbol. The leaderboard resets weekly, generating incentive to exercise.

3. Forest - Stay Focused is an accountability-facilitating software which targets procrastination and excessive phone use. The app harnesses existing needs and motivations of the users and couples them with a virtual incentive to complete the user's self-imposed goal. It allows players to set a timer which plants virtual trees, during the growth process of which they can not exit the app. If the app is exited, the virtual tree dies. The app's effectiveness lies in the empathy factor, combined with an existing need to complete a task.

4. Habitat - the Game, is a mobile game built by students as part of the "Games for Change" challenge. The game's main aim is to integrate sustainable lifestyle choices into daily life as part of the in-game "mission and point system", thus gamifying the experience. In the game, the player cares for a virtual polar bear, completing challenges and quests to keep the bear alive and healthy. Some of these tasks include physical world challenges such as turning off the tap while brushing your teeth. The game is aimed at the young segment of the population and uses the empathy factor to link sustainability to the health of a virtual pet. This incentivises young people to complete the tasks with the promise of virtual rewards.

	Fair Finance International	Strava	Forest - Stay Focused	Habitat - The Game
Firm Size / Description	Oxfam is a large NGO created in 1942, yearly Oxfam partners with 90 countries.	Strava is a small company consisting of 7 employees	Seekrtech is an Indie Games company with a team of less than 5 people.	Small student team of 15 people.
Reach	Reached more than 22.2 million people in 2018/2019	One million new users every 45 days, with 8 million activities uploaded each day.	Over 4,000,000 total users as of 2020	5,000 downloads monthly
The overall level of interactivity	Low level of interactivity, with some basic interaction within the visualisation.	High levels of community interaction, as well as the interactivity of the information, collected/, presented.	Medium level of interactivity, some customisation and progress reporting, gamification and digital rewards.	Medium levels of interactivity with users performing regular virtual and real-world tasks to complete virtual objectives.
Is accountability encouraged?	The source only acts as a provider of information, and not as an accountability tracker.	Automatic logging of activity through third party devices facilitates continued accountability.	Accountability encouraged through the empathy factor. The "prize" is lost upon failure.	Lacks accountability tracking as all information is inputted by the user.
Intended frequency of use.	On-demand usage model.	Accountability is coupled with a competitive environment to encourage prolonged use.	Consistent use is encouraged as progress is aggregated over the week, month and year.	Daily use intended with "daily tasks" occasioning in continuity rewards.
Educational Capabilities	Acts a great source of information, giving simplified scores within high-level categories.	Encourages learning by example.	No real educational capability.	No information is provided of the real world impact of your actions, but virtual consequences attempt to mirror real impact.
Intended Audience	Adults with a higher education and an	Individuals within the fitness niche, who are	A general audience with an existing motivation to	Kids and young people looking for a new

	existing interest in the sustainability of the banks they are using.	looking to improve their accountability.	increase productivity.	pastime/casual game.
Incentivisation	Doesn't incentivise continued use, but rather on-demand usage.	Gamified rewards and community competition are effectively harnessed as the key incentive.	Gamified rewards and virtual accomplishments mapped across real-world tasks.	Rewards and punishments grounded in empathy. Gamified tasks that yield virtual rewards.

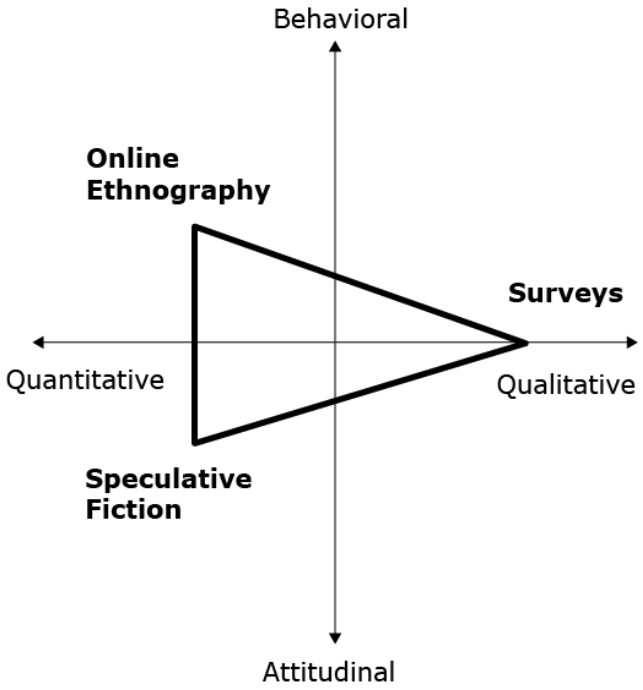
The resulting perceptual map revealed an immediate market gap. There was no solution in place that attempts to provide educational material in an engaging and interactive manner. Notably, none of the analysed solutions fell into the undesirable quadrant either, reinforcing the perception that each solution has effective features.

The challenge remains to create a solution which is both interactive, and informative, balancing both qualities equally.

Primary Research

To ensure the applicability of secondary research to our current audience, as well as to fill knowledge gaps, a round of primary research was conducted. The enquiry allowed for triangulation of the current state of our target segment with existing research into the problem area, while also gathering richer insights into more nuanced areas of interest.

An online ethnography painted a clear picture of the context in which discussions on climate change denial take place and the arguments that are used in opposition to the scientific consensus. A generalised survey allowed for corroboration of the insights on perceptions of climate change gathered several years ago by larger independent research firms. Finally, a set of speculative fiction writing sessions with members of our target audience allowed us to take a deeper dive into the understandings and perceptions of climate change through the eyes of the participants. Each method was selected to cover both behavioural and attitudinal dimensions of research, as well as to gather quantitative and qualitative data.



(Figure 3 - Primary research method triangulation.)

Online Ethnography

While there has been a wealth of work done to identify and dissect common arguments against climate change, little has been done to observe and document the spaces in which this ideology is perpetuated. The online ethnography process is a strain of contextual observation used to survey and analyse online spaces in a structured manner. Focus was placed on identifying the 5 pillars of climate change denial in the field, and observing the interactions between members as they debate and discuss the information at hand.

Five separate spaces were identified and selected for analysis. Two of these spaces were self-proclaimed discussion boards for people who maintain the position of a skeptic, while the other three were self-proclaimed debate groups. Each post was isolated, the context documented in a short description, key themes extracted, and salient arguments identified. This information was then recorded in a table appendix 2 (2.3).

The resulting data corroborated earlier secondary research findings, but further analysis culminated in a worrying discovery. The members who partake in discussions in such spaces lack the willingness and malleability of opinion to be convinced otherwise. Without fail, whenever each member was challenged on their views, or asked to provide a peer-reviewed source for the data they used, they would turn defensive, or leave the conversation altogether. In a disappointing turn of events, some members began harassing each other, using derogatory language with reference to the poster or simply provoking the other members.

These trends highlight an unfortunate fact: the members of such spaces are not looking for productive discussion and do not wish to be educated on the opposing party’s views. While this makes them a poor target audience in the case of the brief discussed in this proposal, they remain a highly interesting segment. There is great potential for further research and documentation of such online activities and possibly, a future solution to transform the spaces from echo chambers to facilitators of productive debate.

Surveys

To validate the initial findings from secondary research, an online survey was conducted. A total of 55 respondents completed the survey, which was distributed to the target audience through social media. The survey questions addressed the findings extracted from the paper "Public risk perceptions, understandings, and responses to climate change in Australia and Great Britain", Joseph Reser to ensure that the statistics are consistent with our target audience. The key takeaways from the surveys can be broken into 3 areas of concern: media skepticism, individual impact/accountability, and clean money**.**

1.1 Media Skepticism

Misinformation in the media is a phenomenon that all individuals are unconsciously exposed to on a daily basis. The paper "Public risk perceptions, understandings, and responses to climate change in Australia and Great Britain", Joseph Reser explored the public perception towards the media and found a large proportion of participants had lower levels of trust with the media and the government, compared to scientists. To objectively confirm these beliefs for the purpose of this proposal, participants were asked:

- Do you believe you have ever been misinformed by the media?
- Give an example of a time you believe you have been misinformed by the media.

The survey responses showed that 77% of participants believed that they have been misinformed by the media on at least one occasion.

For example, one of the respondents expressed the following concern:

> *"It was when I was watching a Spanish news channel that covered the protests of George Floyd that erupted in the Los Angeles and Beverly Hills area. The media portrayed it as a negative issue that would harm businesses. Although some aspect of that is true, most corporations like Target and Best buy are mostly insured for riot damage. The reason people are protesting is because they have had enough of the current economic system and social issues that have taken place under the Trump administration and other republican presidents like George Bush."*

This fundamental lack of trust in the information channels, coupled with overexposure to issues such as climate change, culminates in mental fatigue and desensitisation. The challenge remains to re-ignite the audience's engagement with the issue without the ability to tackle the wider concern of misrepresentation/bias in the media.

1.2 Individual Impact and Accountability

To target research question 2: 'How can we raise awareness of the impact of individual lifestyle choices on the climate/environment?' participants were asked "How likely do you think it is that limiting your own energy use would help reduce climate change?". This question addressed people's perceived individual impact; specifically, their ability to enact change through individual action. As many as 60% of participants agreed it was likely to have a positive impact, which corroborates with secondary research findings. This significant percentage also suggests that the gap in risk perceptions between the public and experts may be decreasing. However, just as the secondary research suggested, participants continue to view their individual contribution as minute on the

global scale, which negatively affects their ability to remain motivated and accountable. To assist in identifying the influences which may maintain motivation in our audience, the following question was posed to the respondents:

- How likely is it that other people will willingly change their lifestyle to combat climate change?

Over 46% of participants responded with the belief that others aren't willing to change their lifestyle to combat climate change. This result suggests a strong need for community engagement and collective action as a motivator for the maintenance of individual effort. This consideration informs a potential solution: by harnessing collective action, it's possible to combat perceptions of powerlessness and insignificance, as well encourage accountability.

The present lack of accountability is another contributor to inaction, as it leads individuals to feel isolated and minute in the climate change fight and stagnates their desire to help. This model of motivation is supported by the survey response to the following question:

- There are some things that can be done to reduce energy use, such as switching off appliances that are not being used, walking for short journeys, or only using the heating or air conditioning when really needed. In your daily life, how often do you make an effort to reduce your energy use?

Over half of the respondents reported performing these tasks infrequently or not at all. Such a response suggests a lack of initiative within the daily life of the respondents, and instead, disengagement between people's beliefs and their actions. Studies indicate that much of everyday action is characterized by habitual repetition. (Neal et al., 2006) Small, routine tasks are the key element in the behavioural change required to make an individual difference. Therefore, the ability to facilitate habit building is an important criterion that will ensure success of any potential solution. To further understand habitual behaviour, the habit building process must first be understood. Successful habit change interventions involve disrupting the environmental factors that automatically cue habit performance. (Verplanken & Wood, 2006). According to David T. Neal habitual behaviour is developed through three learning models (Neal et al., 2006): direct cuing, implicit goals, and motivated contexts. These areas best account for the characteristic features of habit responding—in particular, for the rigid repetition of action that can be initiated without intention and that runs to completion with minimal conscious control. Neal further comments that habits are response dispositions that are activated automatically by the context cues that co-occurred with responses during past performance. This theory informs yet another criteria for success - the significance of a consistent, engaging presence of the solution to ensure effective habit building.

1.3 Clean Money

The final area in which the participant's perceptions were examined by this survey involved responsible purchasing decisions. As stated earlier, supply is driven by demand, which remains in the hands of a business's bottom line. While the majority of respondents (68%) agreed with the idea that large businesses have a negative impact on the environment, these beliefs did not carry over to their buying behaviours. When asked

to rank product characteristics that were important to the respondents when making a purchase, the most popular categories were quality and cost (46% and 39%). Sustainability featured heavily among the less important criteria. This information further confirms the observed gap between beliefs and behaviour. In order to meet the objectives outlined in the brief, the design team must aim to close this gap through the proposed solution.

Interviews: Speculative Fiction Writing

To further explore the perceptions and motivations that drive our target audience, a set of interviews was run. 6 participants from New South Wales were selected for an online appointment via Zoom conferencing software.

To avoid the social desirability bias associated with discussions on climate change, unlock deeper beliefs and increase participant engagement, the interview process was evolved into a fiction writing session. The participants were provided with a prompt, and a set of questions to facilitate world-building. This process allowed them to verbalise their understanding of the climate change crisis, magnified through the lens of speculative fiction.

They were asked to describe two extreme futures - a positive (utopia), and a negative (dystopia). The utopia was described as "a future in which humans made every right decision regarding climate change", and the dystopia was defined as "a future in which humans made every wrong decision regarding climate change". For each, they were asked world-building questions, covering the visual aesthetic, the appearance and lifestyle of an average citizen, the state of industry and commerce and the sensory imagery they associate with the scenario. Each of these topics targeted an individual area of understanding of climate change. It's worth noting that the aesthetic was heavily influenced by the media the participants consume. Many made reference to a film when attempting to describe their surroundings.

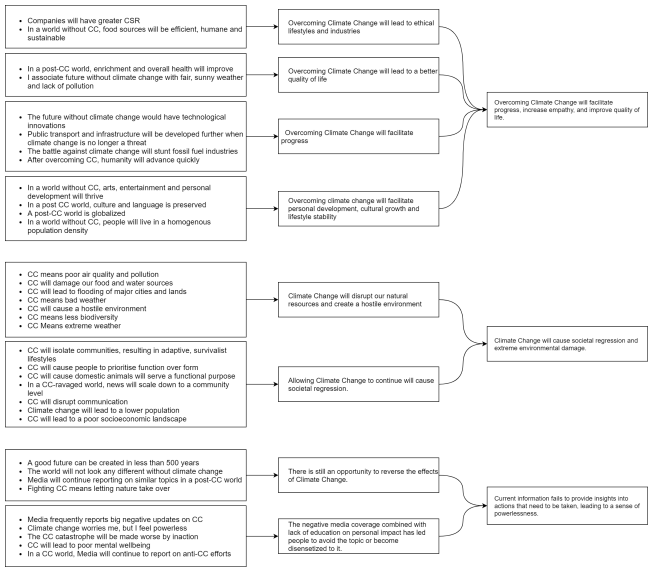
The order in which these scenarios were presented was alternated among the interviews to avoid unintentional priming or bias.

The recordings of each session were transcribed through Otter.ai (an Artificial Intelligence transcription software) and corrected manually for any inconsistencies. The transcripts were then imported into NVivo (a research processing tool) for streamlined collaborative analysis.

Thematic Analysis

Thematic analysis was performed on the transcripts, following the Gioia methodology to maintain academic rigor (Gioia, Corley & Hamilton, 2012).

Transcripts were shared among the team members and key themes were synthesized through the "coding" process. The 2 codebooks containing a total of 113 codes were exported and compared among the research team.
Codes discussing analogous themes were consolidated, and codes with less than 3 occurrences were discarded or merged with more significant, overarching points. Second order themes were extracted by combining the remaining 35 codes into 8 subgroups. The subgroups were synthesized into 3 aggregate dimensions, which became the key insights gathered from this user group. The method produced a succinct data structure (see figure 4) which was used further in the design process to generate potential solutions against the key needs and motivations of our target user group.



(figure 4 -Thematic Analysis Overview.)

The Overall, the participants demonstrated high levels of engagement with the world-building activities, showing both creative and analytical involvement. There was a consensus among the participants, that solving climate change requires a shift in various aspects of their lifestyle, including food sources and humanitarianism. The participants maintained a belief that climate change poses a threat to their quality of life in the current state and overcoming it would create a net positive effect. Participants appeared to believe that climate change in its current state is hindering scientific process and innovation. Particularly, by overcoming the threat, people can pave the way for scientific discoveries that will facilitate innovation in all aspects of life. Consistent with the perception that climate change has a negative impact on their quality of life, participants maintained that overcoming the threat will allow people to grow mentally and culturally.

All participants created a consistent image of a hostile environment created by climate change in the future. They spoke of natural disasters, rising sea levels and pollution to the degree of making the earth an unliveable wasteland. Participants further clarified that the hostile environment created by climate change will facilitate both technological and social regression. There is a prevalence of “Function over form” - maintaining that all cultural and aesthetic elements from current lifestyles will be stripped in favour of a fight for survival. Participants confided in the researcher about their frustrations with the current media portrayal of the issue, and the overall powerlessness they felt. This sentiment particularly highlights the need for greater education and speaks to the project brief.

When synthesized, the findings fed into 3 key themes- referred to as aggregate dimensions. The first theme spoke to the net positive effect that overcoming climate change will have. The second aggregate dimension encompassed the net negative effect that allowing climate change to take full force will cause. The third, and most vital aggregate dimension incorporated the feelings of helplessness as well as the numbness felt as a result of overexposure to distressing imagery combined with a lack of guidance. This observation feeds into the existing consensus among primary and secondary research - the disengagement with the issue is a key culprit in the indifference and inaction that the scientific community is fighting against.

Concepts

Concept Generation

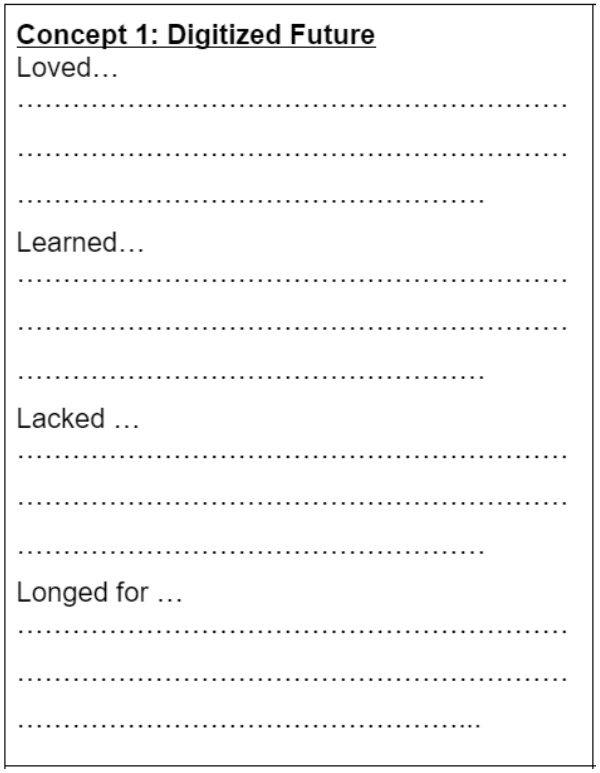
Brainstorming sprints were used to generate a list of stakeholders, possible tasks and technologies that fit within our brief. These elements were then used to randomly generate “How might we...” statements,

citing an activity, a stakeholder performing it and the technology it is performed through. This method created a range of unique design prompts that facilitated rapid concept generation. Each prompt was allocated a 1-minute design sprint, in which a rough, high-level concept was formed. (Appendix X) This activity generated 20 high-level concepts, which were then evaluated by the team. Each concept was pitched to the team, and potential strengths, weaknesses and feasibility issues were discussed. Through this framework, the concept range was narrowed down to 6 refined solutions.

Concept Evaluation

In order to objectively evaluate our concepts against the design brief and general feasibility criteria, a Pugh Matrix was constructed. (Appendix 4) Each criterion was given a weighting of 1-3, to ensure that significant criteria were amplified, and the final score reflected a more accurate valuation of the concept. This process helped the team discard two more concepts, retaining some successful features to be fused with the remaining four.

To further ensure the feasibility of our proposed designs, a feedback session with five randomly selected members of the target audience was run. After pitching each concept, they were asked to communicate their feedback in a 4L's matrix (fig. 5) (Atlassian, 2020). The retrospective framework lent itself terrifically to capturing critique in a structured format.



(Figure 5 - 4L's Retrospective Matrix Example)

Based on the above template, feedback was combined and synthesised, while maintaining the 4L's structure.

It was quickly obvious that while 3 of the 4 concepts performed well with the users, there was very little positive feedback about the 4th. Formerly known as Concept 3 - "Ruler of the Planet", the concept was discarded, following negative reception. The users

highlighted it's lack of real-world impact, and similarity to existing solutions on the market.

The process left 3 concepts, all of which maintain the potential for further growth and success in the future project stages. Section 3 discusses each concept in depth, demonstrates artist's representations of each concept's form, and is accompanied by users' feedback.

Concept 1: Digitised Futures

Users are prompted to fill out a quiz, which assesses their individual lifestyle and its impact on the climate. Based on the results, a virtual reality world is generated for the user, representing the future where everybody followed the user's lifestyle. Users would be able to explore the simulation by walking around. By virtually immersing them in the world, the solution aims to facilitate self-reflection, and a consideration of their individual impact. This solution addresses the disconnect people experience between their lifestyles and their direct impact on the climate.

Currently, similar existing simulations rely on the format of objective data visualisation to communicate similar ideas, but the resulting solutions fail to immerse the user in the results. The proposed solution seeks to change that by taking an artistic approach to data visualisation.

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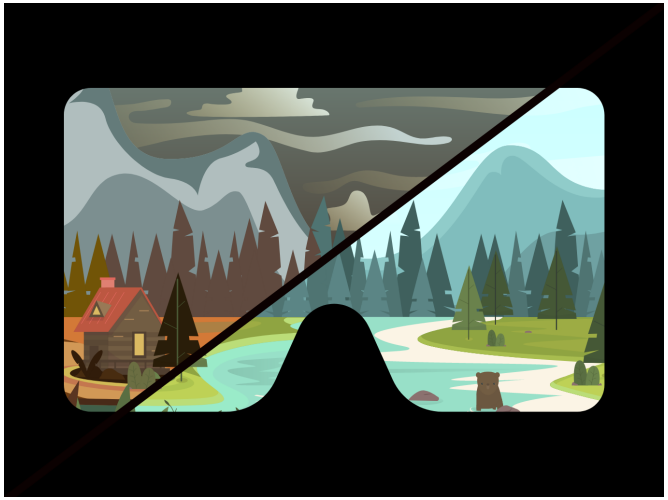
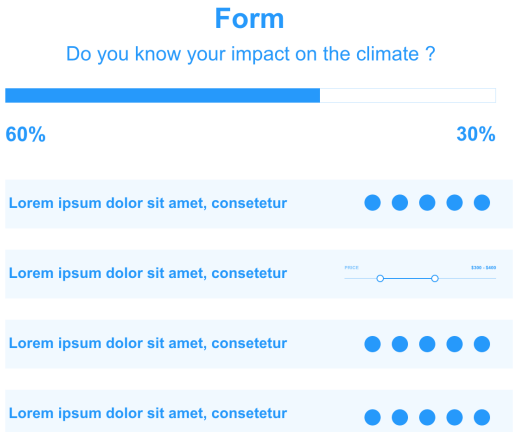


(Figure 6 – Vr world.)

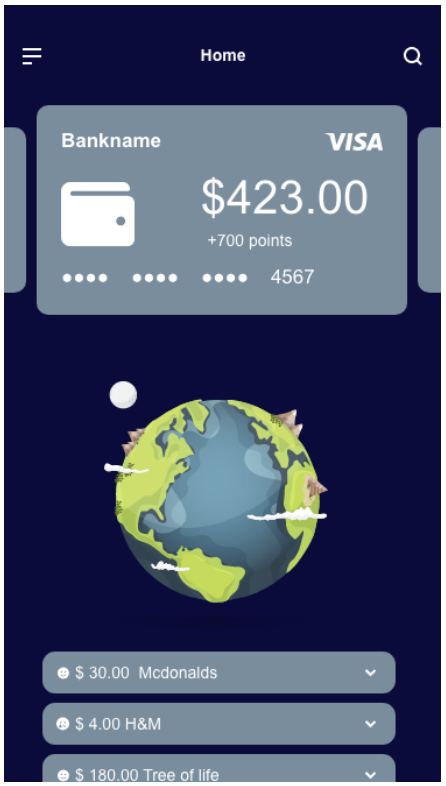


(Figure 7 – form to assess individual impact.)

CONCEPT 1 PARTICIPANT FEEDBACK:

Successful Features	• I like the novelty of VR. It entices me to use it • Love the combination of data entry and VR, it helps me see my impact clearly and understand the direct connection to my actions • It would show me whether my efforts are meaningful. • That you can see your real impact right now. That's both exciting and confronting
Unsuccessful Features	• Disconnect between initial surveys and the visualisation. It lacks the narrative experience • The form-filling process is a de-motivator. The process is too boring and tedious • Accountability • Lack actionable goals and educational material
Interesting Discoveries	• Relies on this initial shock factor to enact change • The average Australian consumes 6 times more than the average global citizen, and this is a great opportunity to highlight that
Missing Elements	• Needs more actionable outcomes • It's good to see and be aware of my impact, but my greatest problem is that I don't do the right thing even when I know it • Experience learning instead, I don't like surveys, but if you emerged me into a narrative where I'm faced with certain decisions, it will help me understand better and be more engaged with the topic. • Social media integration, I like the possibility of seeing your friend's world • Accountability to empower and make others better

Concept 2: Tamagotchi Earth



(figure 8 – Vr world.)

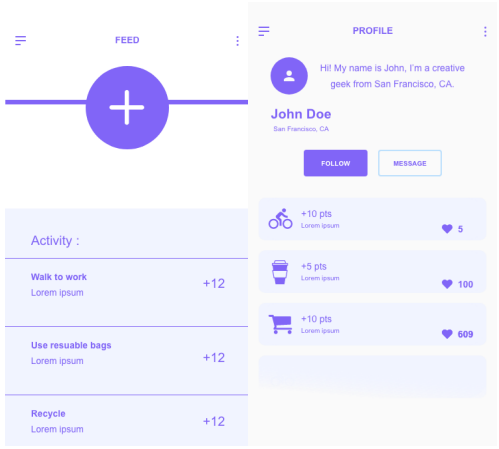
As an integration into an existing online banking service, the user is given a virtual world that they are responsible for caring for. The virtual world's health responds to the user's spending behaviours, which are analysed with regard to sustainability of the business they support. Depending on the business's environmental impact (waste created, resources consumed, emissions produced) the planet's health would change. This actively encourages accountability for spending habits, by building a direct connection between the purchases and their relative carbon footprint. Each purchase is rated according to existing sustainability guidelines, and scores are available to the customers, allowing them to make better choices. While there are existing solutions that follow a similar route, none rely on real time purchasing data, but rather work off the self-entered information. This requires additional commitment and can become bothersome. By eliminating the process, we ensure accurate input and continued data entry.

CONCEPT 2 PARTICIPANT FEEDBACK:

Successful Features	• Love that it integrates with my bank account, cause I know people aren't going to be bothered to put it in manually, reminds me of that forest app • I feel I am more connected with a living being, so I like that the design simulates that • Love that it integrates into my existing lifestyle
Unsuccessful Features	• Lost me with the data - security concerns, partnering with banks? • Are there any incentives to keep them using it? If it's run within a bank, I will use it, but if it's run through a third-party app, I will not have the motivation to look back on it. • Privacy concerns with data handling between my purchase and the feature

Interesting Discoveries	• How can you collect that data without invading personal space? • Seeing direct consequences for my actions is fascinating. It's never been so clear - how my purchases impact sustainability.
Missing Elements	• Game strategy and orientation • More severe consequences, that replicate real life - e.g. animals dying or ecosystems being destroyed.

Concept 3: Socially Networked Sustainability.



(figure 9 – Socially Networked Sustainability mockup.)

The concept takes shape as a social networking platform which encourages behavioural uptake of climate-friendly activities. The app takes user input, gathering data on the daily tasks they perform in an effort to lead a more sustainable lifestyle. Users can also view friends' progress and interact with each other through commenting on each other's' efforts.

The app maintains incentive through gamification features, using the leader board which works on a point-based system, with higher point rewards for more impactful tasks. This concept seeks to break the inaction limbo by engaging the community and encouraging competition, thus providing motivation and facilitating habit building. By establishing usage patterns within the daily lives of users, the solution will have greater repercussions, even after the user leaves the platform. While this has never been attempted in the context of climate change, this strategy has been hugely successful in categories such as fitness or self-improvement. Additionally, it harnesses the social desirability bias, by placing the users in a community of similar minded individuals all working for a greater cause.

CONCEPT 3 PARTICIPANT FEEDBACK:

Successful Features	• Gamification leader board • More motivating than educational, Learning by example • Provides guidance and builds a culture • Competition keeps me more motivated, and if we are both competitive than it will drive

	us and work • Collaborative way to be better • I love how I know if one person starts you kind of get in your friend group and community involved • It encourages accountability and community effort, they know what the right this is, they are so sick of hearing about it • Being peer pressured to do it provides the incentive to get started
Unsuccessful Features	• User input is subject to bias/lying • Effort of importing data manually can discourage people • It would make it worse for me because my friend will make fun of my efforts: How do I find a like-minded community?
Interesting Discoveries	• It will work for different people (some people don't use social media, or engage with competitive environments) • How do we skip the input process?
Missing Elements	• I only ever play club sports because I always enjoy team sports. If you could incorporate the team culture into it and could use collaboration-based achievements. • Some form of habit building
	encouragement, like streaks where you have to collectively use it regularly. • The matching system where it's competitive enough that I will try but not too competitive that I will want to get off • What if we got business involved?

Hardware and software requirements:

Operation:

Within the constraints of the brief, the nominated platform for the potential solution is a web application; therefore, the user will require a device with the latest version of least one of the below:

- Chrome
- Safari
- Edge
- Firefox
- Internet Explorer
- Opera

In addition to the above, the device must have hardware capable of running graphical elements represented in WebGL. The recommended devices are the below (or similar):

- A personal computer with at least an Intel Core i5-6400 processor or equivalent, and a dedicated graphics processor equivalent to the Nvidia GTX750
- A mobile device with an Apple A11 Bionic processor, a Qualcomm Snapdragon 855 processor or equivalent

Development:
The above solutions will be developed in the Unity Game Engine and exported as a WebGL plug-in. The programming languages JavaScript and C# will be used situationally.
2D and 3D Assets may be purchased and downloaded for use in the engine, with full attribution. Hardware requirements remain consistent with those described above.

References:

Atlassian. (2020). The "4 Ls" Retrospectives | Atlassian. Retrieved 20 September 2020, from https://www.atlassian.com/team-playbook/plays/4-ls-retrospective-technique

Tsfati, Y., & Cohen, J. (2012). Perceptions of media and media effects: The third person effect, trust in media and hostile media perceptions. *The international encyclopedia of media studies*.

Tsfati, Y. (2003). Media Skepticism and Climate of Opinion Perception. *International Journal Of Public Opinion Research*, *15*(1), 65-82. https://doi.org/10.1093/ijpor/15.1.65

Tsfati, Y. (2010). Online News Exposure and Trust in the Mainstream Media: Exploring Possible Associations. *American Behavioral Scientist*, *54*(1), 22-42. https://doi.org/10.1177/0002764210376309

Boush, D. M., Friestad, M., & Rose, G. M. (1994). Adolescent skepticism toward TV advertising and knowledge of advertiser tactics. The Journal of Consumer Research, 21(1), 165-175.

Giarlo, M. J. (2006). The role of skepticism in human-information behavior: a cognitive-affective analysis. *Library Student Journal*, *9*, 1-13.

Merriam-Webster, Merriam-Webster'S. Collegiate. "Dictionary." *Springfield, Massachusetts, USA: G & C Merriam Company* 830 (1977).

Sears, D. O., & Freedman, J. L. (1967). Selective exposure to information: A critical review. Public Opinion Quarterly, 31(2), 194-213.

Lorenzoni, I., & Pidgeon, N. F. (2006). Public views on climate change: European and USA perspectives. *Climatic change*, *77*(1-2), 73-95.

Drews, S., & van den Bergh, J. C. (2016). Public views on economic growth, the environment and

prosperity: Results of a questionnaire survey. *Global Environmental Change*, *39*, 1-14.

Marlon, J. R., Kelly, R., Daniau, A. L., Vannière, B., Power, M. J., Bartlein, P., ... & Feurdean, A. (2016). Reconstructions of biomass burning from sediment charcoal records to improve data-model comparisons. *Biogeosciences (BG)*, *13*, 3225-3244.

Singh, A. S., Zwickle, A., Bruskotter, J. T., & Wilson, R. (2017). The perceived psychological distance of climate change impacts and its influence on support for adaptation policy. *Environmental Science & Policy*, *73*, 93-99.

Reser, J. P., Bradley, G. L., Glendon, A. I., Ellul, M. C., & Callaghan, R. (2012). Public risk perceptions, understandings, and responses to climate change and natural disasters in Australia and Great Britain. *National Climate Change Adaptation Research Facility, Gold Coast*.

Weber, E. U., & Stern, P. C. (2011). Public understanding of climate change in the United States. *American Psychologist*, *66*(4), 315.

Sullivan, A., & White, D. D. (2019). An Assessment of Public Perceptions of Climate Change Risk in Three Western US Cities. *Weather, Climate, and Society*, *11*(2), 449-463.

Earl Bennett, Staci L. Rhine, Richard S. Flickinger, S. (2001). Assessing Americans' opinions about the news media's fairness in 1996 and 1998. *Political Communication*, *18*(2), 163-182.